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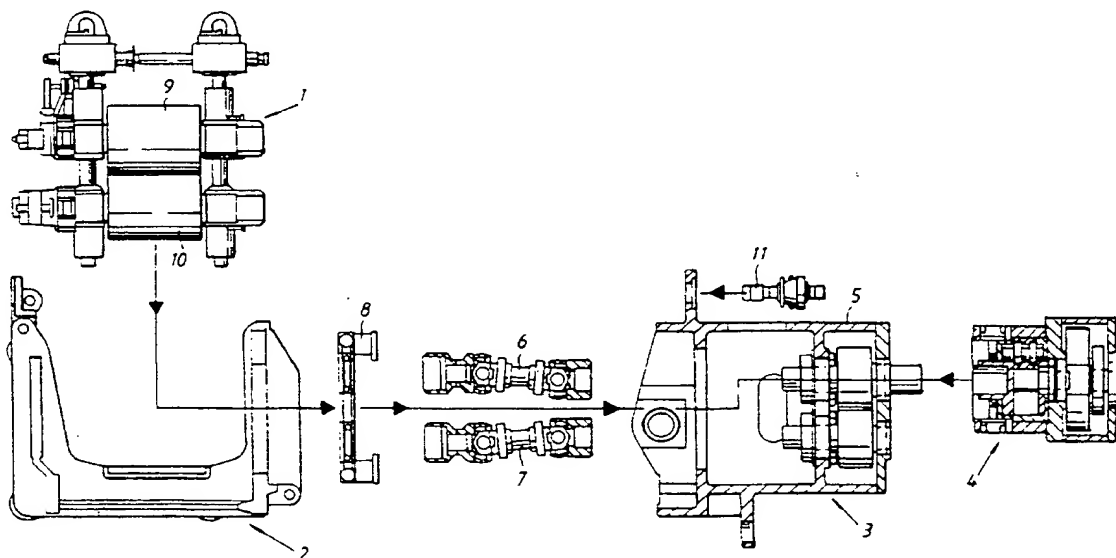
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(54) Title: A COMPACT ROLL STAND ARRANGEMENT



(57) Abstract

The present invention relates to a roll stand arrangement comprising a roll unit (1), two drive spindles (6, 7), a pinion stand (3), a pinion stand housing (5) and a drive unit (4). According to the invention, the components (1-4) of the unit, including the drive unit (4), are carried by the pinion stand housing (5).

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A Compact Roll Stand Arrangement

The present invention relates to a roll stand arrangement of the kind comprising a roll unit or roll assembly, two drive spindles, a pinion stand, a pinion stand housing, and a drive unit.

The roll stand arrangements of a present-day rolling mill forming part of a rolling line are comprised of separate parts which are attached to a supportive base structure and mutually connected to form a functional unit by means of couplings, such as quick-fasteners for instance, which enable the various components to be separated from one another for exchange or maintenance purposes. One drawback with an arrangement of this kind resides in the work required to replace components, for instance to change the rolls. Another drawback resides in the amount of assembly work necessary in installing and trimming such a roll stand arrangement in order to integrate the unit in the rolling line.

An object of the present invention is to eliminate these drawbacks and to provide a roll stand arrangement which can be mounted selectively with the rolls extending horizontally or vertically.

According to the invention, this object is achieved with a roll stand arrangement of the kind defined in the introduction which is characterized in that the unit components, including the drive devices, are carried by the pinion stand housing. Because the roll stand arrangement is constructed as an assembled unit at the time of its manufacture, the unit can be transported to the rolling mill and assembled in the rolling line in the form of a single unit, which greatly shortens and simplifies installation of the unit. Furthermore, unit components or the actual unit itself can be replaced very quickly, since only the pinion

stand housing is attached to the supportive base structure. Furthermore, the rolls of such a roll stand arrangement can be placed both horizontally and vertically without necessitating adjustment to the unit components, such as changes to the drive transmission, since the unit components are carried by the pinion stand housing and since their positions relative to the supportive base structure depend solely on how the pinion stand housing is attached to the supportive base structure.

According to one preferred embodiment of the invention, the roll unit is carried by a cassette which can be connected to the pinion stand housing with the aid of a coupling by means of which the cassette is fully supported by said housing when the cassette is connected thereto. This facilitates quick exchange of the roll unit of the roll stand arrangement.

The drive unit of the roll stand arrangement will advantageously include an alternating current motor and a planetary gear mechanism, wherein the motor is placed adjacent the planetary gear mechanism parallel therewith and with its output shaft located in the same plane as the input shaft of the planetary gear mechanism, said shafts being mutually connected by means of a torque transmission device. As a result of this arrangement, the gravitational centre of the roll stand arrangement will lie in the centre region of the pinion stand housing, which facilitates handling of the unit during its transportation and during exchange operations, and which means that the bending forces to which the attachments of the pinion stand housing to the supportive base structure are subjected will be smaller than would otherwise be the case.

The invention will now be described in more detail with reference to exemplifying embodiments thereof and

also with reference to the accompanying drawings, in which

5 Fig. 1 is a side view of a roll stand arrangement provided with a drive arrangement according to one embodiment of the invention;

10 Fig. 2 shows the roll stand arrangement in Fig. 1 from above;

Fig. 3 is a sectional view of the roll stand arrangement shown in Fig. 1 with the unit in a dismantled state;

15 Figures 4 and 5 are respective vertical and horizontal sectional views of a roll stand arrangement according to Figure 1 in which the rolls are arranged horizontally; and

20 Figure 6 is a vertical sectional view of a roll stand arrangement according to Figure 1 with the rolls arranged vertically.

25 The illustrated exemplifying embodiment of a roll stand arrangement includes a roll unit 1, a cassette 2, a pinion stand 3 and a drive unit 4. The roll unit 1 is carried by the cassette 2, which in turn is carried by the pinion stand housing 5, as is also the drive unit 4. Two spindles 6, 7 are journaled in the
30 pinion stand housing and are in driving connection with the rolls 9, 10 through the medium of a coupling holder 8 fitted to the housing. The pinion stand housing also carries a roll hoist mechanism 11.

35 The drive unit 4 includes an alternating current motor 12 and a planetary gear mechanism 13, wherein the motor and the gear mechanism are placed adjacent one another with the output shaft of the alternating current motor in the same plane as the input shaft of

the planetary gear mechanism. These shafts extend parallel with one another and are mutually connected by means of a gear transmission 14. The planetary gear mechanism and the alternating current motor are both placed on that side of the gear transmission which lies proximal to the pinion stand housing.

By using a planetary gear mechanism and by placing this mechanism and the alternating current motor adjacent one another, there is obtained a roll stand arrangement which occupies only a small amount of space laterally in relation to the rolling line, while the centre of gravity of the whole of the roll stand arrangement will lie in the central region of the pinion stand housing 5, which is advantageous from an attachment or fastening point of view. In the case of the illustrated embodiment, the alternating current motor 12 is placed on one side of the planetary gear mechanism 13, although the construction which includes a gear transmission 14 which mutually connects the alternating current motor and the planetary gear mechanism enables the alternating current motor to be placed anywhere around the periphery of the planetary gearing, for instance above said planetary gearing. The alternating current motor is attached to the gear transmission housing, and the gear transmission is, in turn, attached to the planetary gear housing, which is attached to the pinion stand housing. However, because of its position on one side of the planetary gear mechanism, the alternating current motor may alternatively be carried directly by the pinion stand housing, if found desirable.

Figures 4 and 5 show the roll stand arrangement illustrated in Figures 1-3 fitted to a supportive base structure 15 with the rolls in a horizontal position. In this case, the roll stand arrangement is mounted displaceably on the supportive structure through the medium of outwardly projecting guide flanges 16 each

mounted on a respective side of the pinion stand housing and extending laterally to the longitudinal axis of the roll stand arrangement, said guide flanges 16 coacting with corresponding guides 17 on the supportive base structure. Mounted on the undersurface of the pinion stand housing beneath the centre of gravity of the roll stand arrangement is an attachment flange 18 which has attached thereto one end of a rod 19 or the like which forms part of a displacement mechanism 20 mounted on the supportive base structure. The displacement mechanism 20 is preferably a rack-and-pinion or screw-nut type mechanism, although other types of displacement mechanisms are conceivable, such as hydraulic piston-cylinder type mechanisms. This arrangement enables the rolls 9, 10 to be displaced laterally in relation to the rolling line, by displacing the whole of the roll stand arrangement by means of the displacement mechanism.

The roll stand arrangement also includes a component fastening mechanism 21 which is mounted on the pinion stand housing 5 and which functions to fasten the cassette 2 to said housing, said mechanism being an eccentric type mechanism for instance, with which rotation of a cylindrical member will bring a surface, which is eccentric in relation to the rotational centre, into abutment with a complementary surface on the cassette and therewith press the cassette forcefully against an abutment surface on the pinion stand housing. Naturally, component fastening mechanisms other than an eccentric mechanism can be used.

In order to enable rolls to be exchanged easily, the cassette 2 is connected to a withdrawal device 22 of known construction when positioned out of engagement with the pinion stand housing 5, i.e. when the cassette is not gripped by the eccentric surface on the component fastening mechanism 21. The cassette, and therewith also the roll unit carried by the cassette,

can be moved to the left in the Figures 4 and 5 by means of the withdrawal device 22, until the entire cassette rests on a carriage 23. The roll unit 1 can be lifted from the cassette with the aid of an over-
5 head crane or the like and replaced with a new roll unit, or alternatively the carriage supporting the cassette and roll unit can be moved to one side laterally in relation to the longitudinal axis of the roll stand arrangement and replaced with a new carriage
10 carrying a replacement cassette.

Figure 6 illustrates a roll stand arrangement according to Figures 1-3 mounted on a supportive base structure 15 with the rolls extending vertically. In this
15 case, the roll stand arrangement is carried by a vertical frame structure 24 firmly mounted on the supportive base structure 15, this base structure being identical to the base structure illustrated in Figures 4 and 5. The frame structure 24 carries the
20 rod or bar 19 which coacts with the attachment flange 18 on the pinion stand housing 5 and which can be moved by means of the displacement mechanism 20 in the manner described with reference to Figures 4 and 5. The frame structure 24 is also provided with guides 17
25 along which the pinion stand housing can slide. Similar to the supportive base structure illustrated in Figures 4 and 5, the supportive base structure 15 of the Figure 6 embodiment includes a cassette withdrawal device 22 and carriages 23 for facilitating cassette
30 exchanges.

Because remaining components of the roll stand arrangement are carried by the pinion stand housing, the roll stand arrangement can be assembled by the supplier and then fitted into the rolling line in the form
35 of a unit. This enables the roll stand arrangements forming part of a rolling line to be fitted, or mounted, very quickly. Since the pinion stand housing is secured to the supportive base structure in a very

simple manner, the task of fitting the pinion stand housing to the base structure can be quickly achieved without the assistance of qualified personnel. Furthermore, the roll stand arrangements can be used with the rolls extending horizontally or vertically without change, which naturally reduces the need of replacement roll-pairs, since only one type of unit need be kept in storage. Furthermore, as a result of the invention, the number of components in the drive unit of the roll stand arrangement has been decreased in comparison with known roll stand arrangements, which means that the number of movable parts which need to be enclosed and maintained is fewer than in the earlier case.

Because the inventive drive arrangement is very short, due to the positioning of the alternating current motor and the use of planetary gearing, a rolling line comprised of roll stand arrangements which include such drive arrangements will occupy only a small space in comparison with a rolling line that is comprised of roll stand arrangements which include conventional drive arrangements, therewith enabling a reduction in the height and breadth dimensions of the rolling mill.

Furthermore, the attachment of the pinion stand housing to the displacement mechanism mounted on the supportive base structure may be different to that illustrated and described and may be comprised of an attachment flange mounted on a respective side of the pinion stand housing and coacting with a respective rod of a correspondingly positioned displacement mechanism, said two displacement mechanisms being driven synchronously with one another. The invention is therefore restricted solely to the content of the following Claims.

Claims

1. A roll stand arrangement comprising a roll unit (1), two drive spindles (6, 7), a pinion stand (3), a pinion stand housing (5), and a drive unit (4), characterized in that the components (1-4) of the roll stand arrangement, including the drive unit (4), are carried by the pinion stand housing (5).
2. A unit according to Claim 1, characterized in that the roll unit (1) is carried by a cassette (2) which can be connected to the pinion stand housing (5) by means of a coupling (21) such that the cassette will be fully supported by the pinion stand housing (5) when connected thereto.
3. A unit according to Claim 1 or 2, characterized in that the drive unit (4) includes an alternating current motor (12) and a planetary gear mechanism (13).
4. A unit according to any one of Claims 1-3, characterized in that the alternating current motor (12) is placed adjacent the planetary gear mechanism (13), parallel therewith, with the output shaft of said motor located in the same plane as the input shaft of the planetary gear mechanism; and in that said shafts are mutually connected by means of a torque transmission device (14).
5. A unit according to Claim 4, characterized in that the torque transmission device is a gear transmission (14).
6. A unit according to Claim 5, characterized in that the alternating current motor (12), the gear transmission (14) and the planetary gear mechanism (13) are each enclosed in a respective housing; and in that the housing of the alternating current motor is mounted in the gear transmission housing, which in turn is

attached to the housing of the planetary gear mechanism.

5 7. A unit according to Claim 6, characterized in that the housing of the alternating current motor (12) is also attached to the pinion stand housing (5).

10 8. A unit according to any one of Claims 1-7, characterized in that the pinion stand housing (5) is provided on each side thereof with guide flanges (6) which project out laterally in relation to the longitudinal axis of said unit and which are intended to coact with guides (17) on a supportive base structure (15) which supports the pinion stand housing (5) and
15 therewith the entire roll stand arrangement, and at least one attachment flange (18) which is intended to be connected rigidly to the supportive base structure.

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Fig. 1

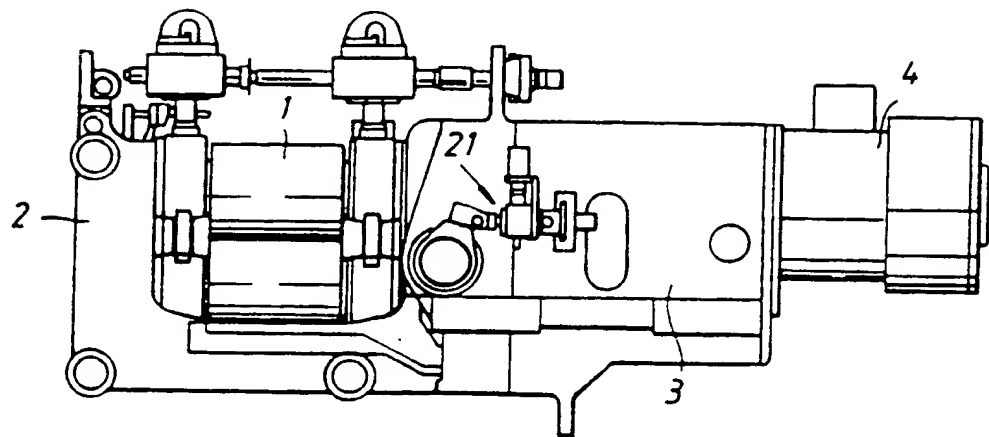
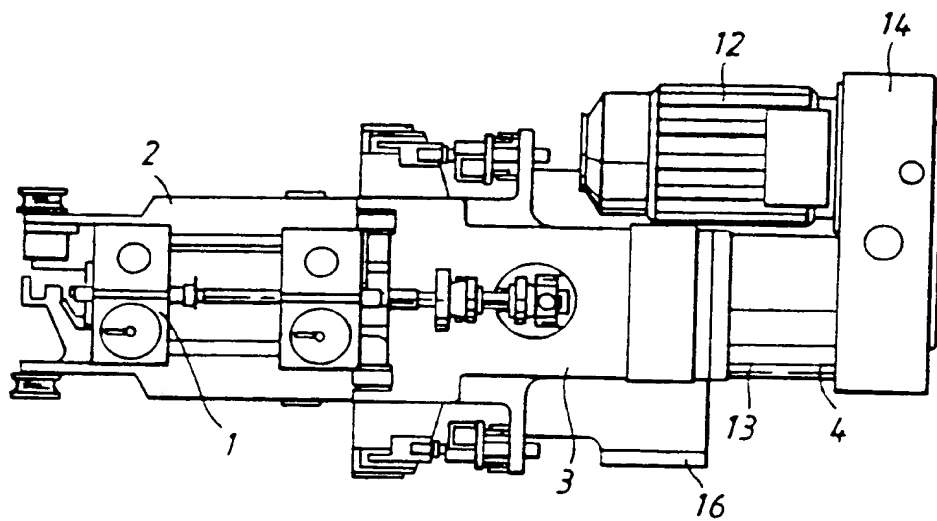
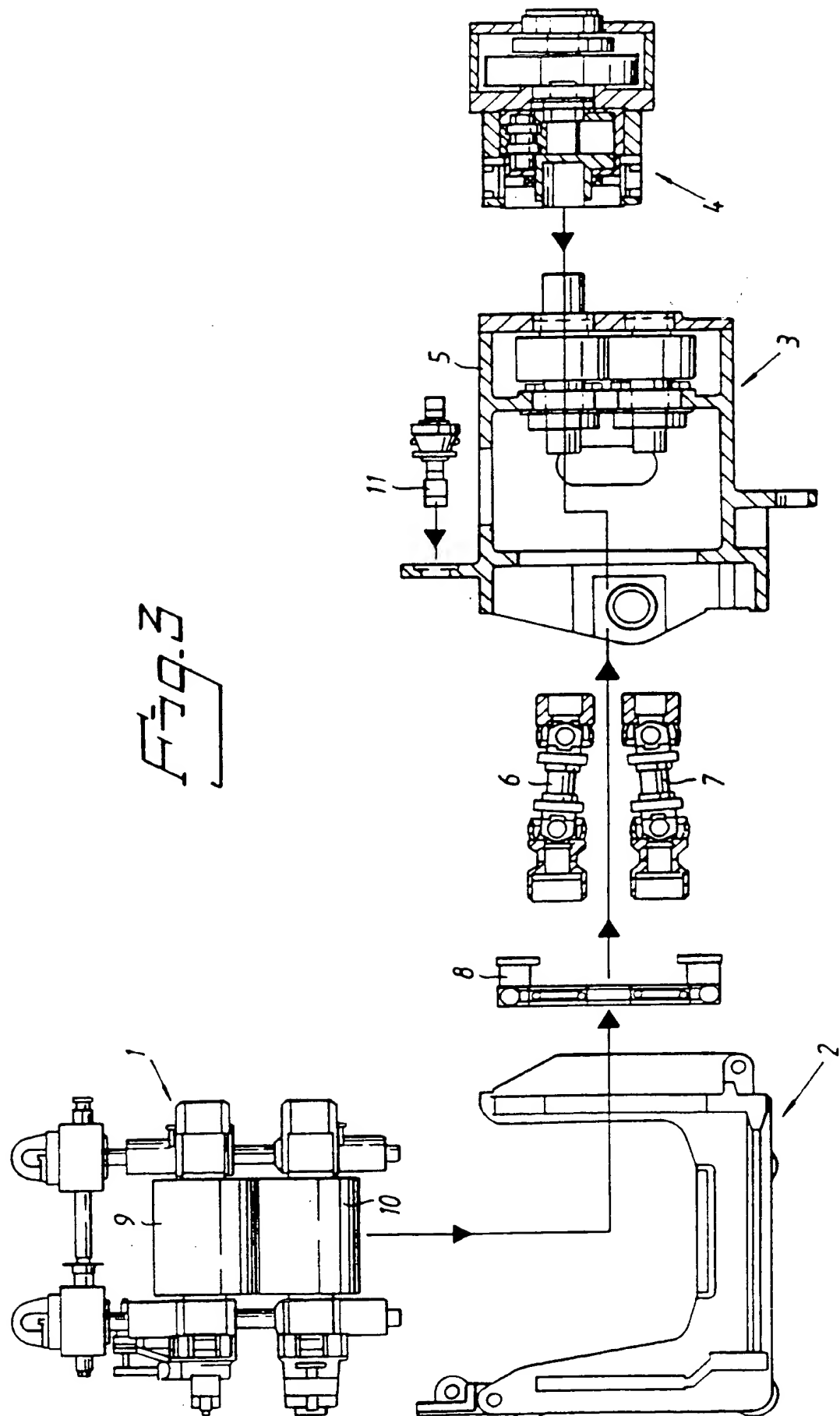


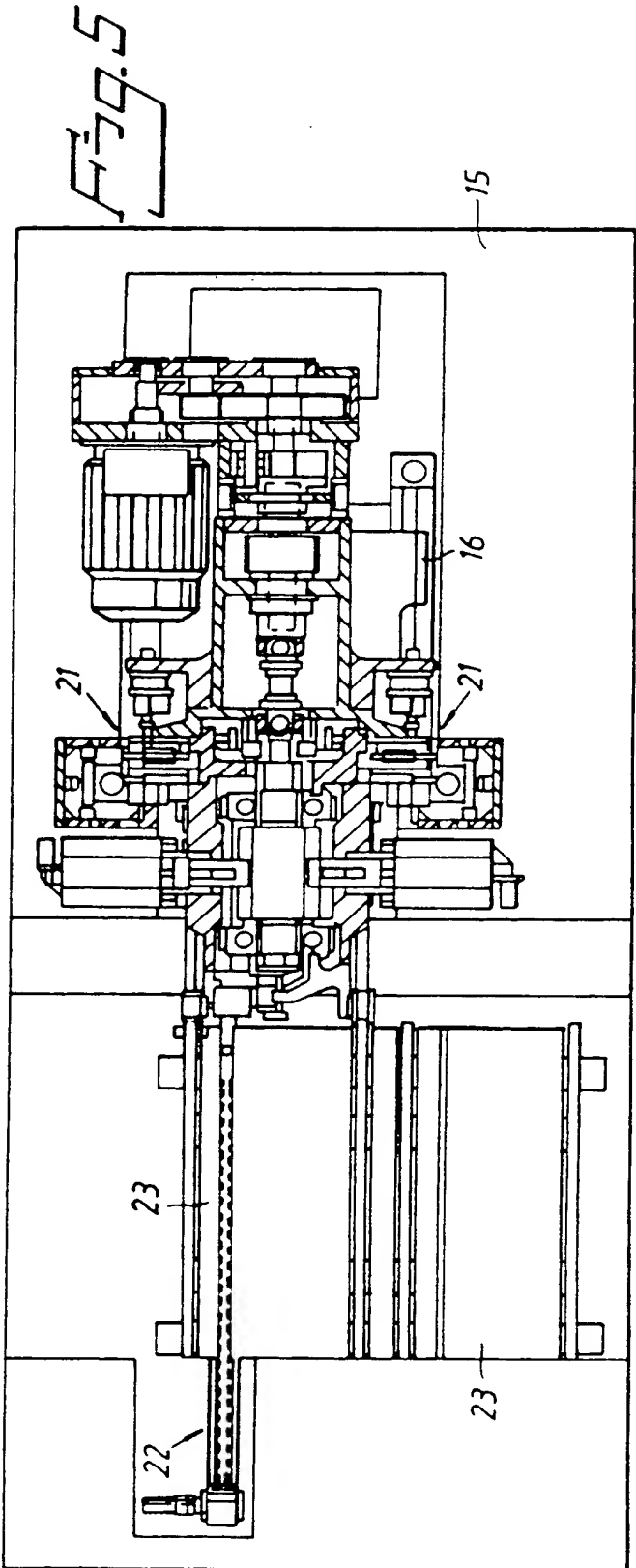
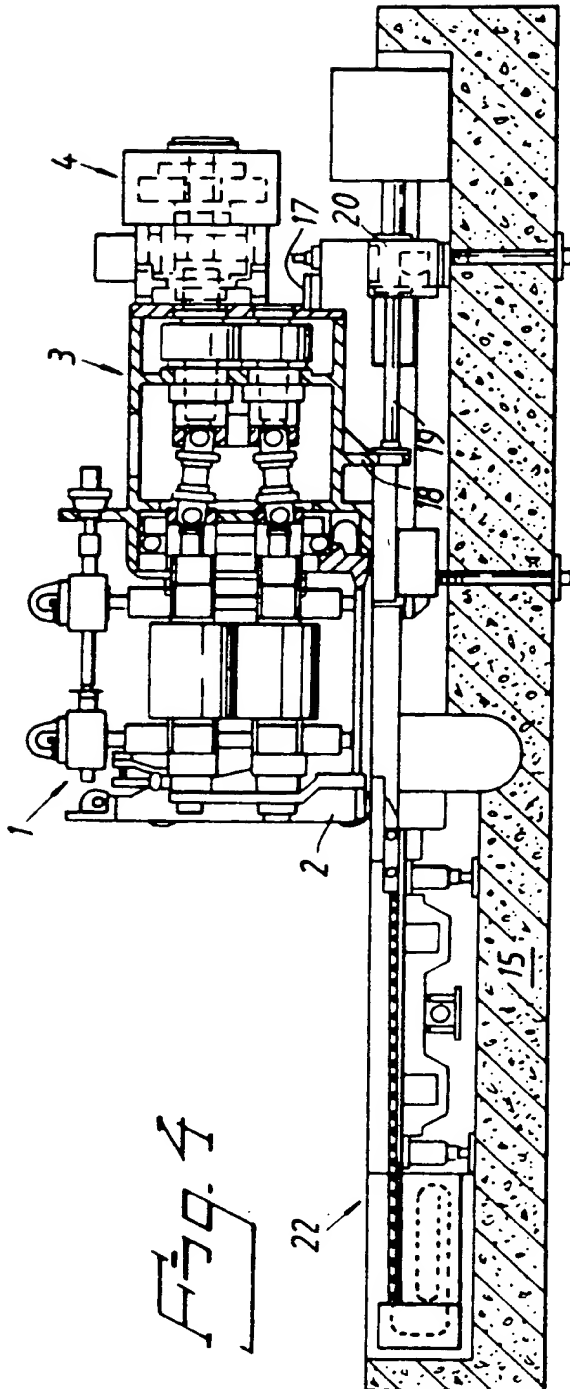
Fig. 2



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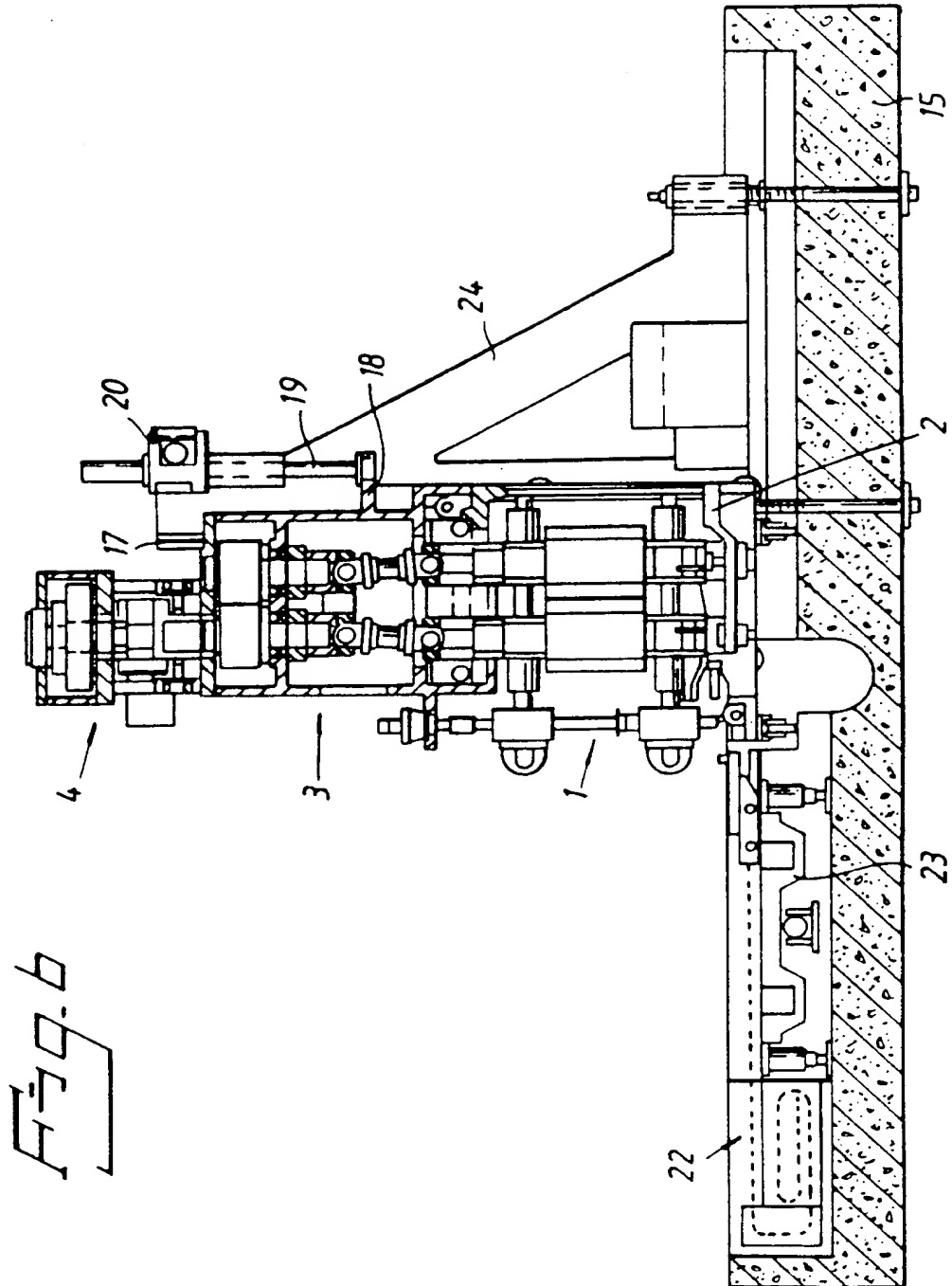


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INTERNATIONAL SEARCH REPORT

International application No.
PCT/SE 94/00211

A. CLASSIFICATION OF SUBJECT MATTER

IPC5: B21B 31/00

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC5: B21B

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

SE,DK,FI,NO classes as above

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C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	AT, B, 350030 (VEREINIGTE ÖSTERREICHISCHE EISEN- UND STAHLWERKE - ALPEN MONTAN AKTIENGESELLSCHAFT), 10 May 1979 (10.05.79) --	1-8
A	US, A, 5078000 (MATSUO ET AL.), 7 January 1992 (07.01.92) --	1-8
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Date of the actual completion of the international search

6 June 1994

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Patent document cited in search report		Publication date	Patent family member(s)		Publication date
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US-A-	5078000	07/01/92	JP-A- WO-A-	1180707 9312898	18/07/89 08/07/93
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